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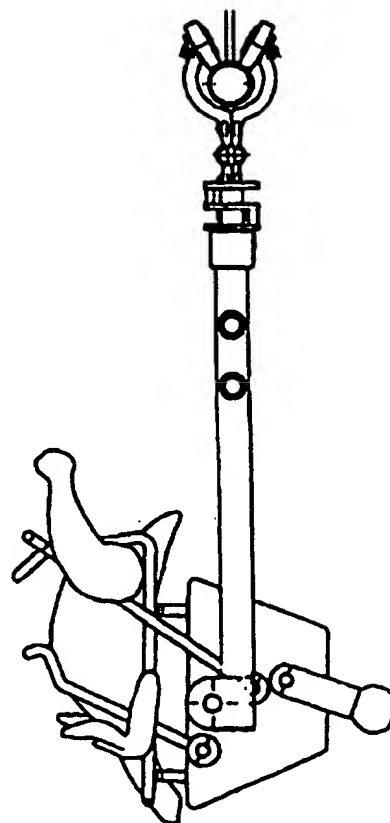
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## INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

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<b>(21) International Application Number:</b> PCT/DK95/00473 <b>(22) International Filing Date:</b> 27 November 1995 (27.11.95) <b>(30) Priority Data:</b> 1350/94 25 November 1994 (25.11.94) DK <b>(71) Applicant (for all designated States except US):</b> LINDHOLST & CO. A/S [DK/DK]; Vestermøllevej 9, DK-8380 Trige (DK). <b>(72) Inventor; and</b> <b>(75) Inventor/Applicant (for US only):</b> BACH, Ole [DK/DK]; Norde Strandvej 28, DK-8400 Ebeltøft (DK). <b>(74) Agent:</b> GREGERSEN, N., H.; Aarhus Patentkontor, Skanderborgvej 40, DK-8000 Aarhus C (DK).		<b>(81) Designated States:</b> AL, AM, AT, AT (Utility model), AU, BG, BR, BY, CA, CH, CN, CZ, CZ (Utility model), DE, DE (Utility model), DK, DK (Utility model), EE, EE (Utility model), ES, FI, FI (Utility model), GB, GE, HU, IS, JP, KG, KP, KR, KZ, LR, LT, LU, LV, MD, MK, MX, NO, NZ, PL, PT, RO, RU, SE, SG, SI, SK, SK (Utility model), TJ, TM, UA, US, UZ, VN, European patent (AT, BE, CH, DE, DK, ES, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE).  <b>Published</b> <i>With international search report.</i> <i>Before the expiration of the time limit for amending the claims and to be republished in the event of the receipt of amendments.</i> <i>In English translation (filed in Danish).</i>

**(54) Title:** METHOD AND APPARATUS FOR HANDLING OF SLAUGHTERED POULTRY, IN PARTICULAR BROILERS**(57) Abstract**

A method and an apparatus for handling slaughtered poultry, in particular broilers, is described, where the individual broiler - during the secondary slaughtering process, where the cutting open and eviscerating of organs and entrails are carried out - is fixed in an individual movable fixing device (2, 32) in such a manner that the fixed broiler in a precise manner may assume desired positions of rotation around a horizontal axis (24) stretching parallel with the direction of conveyance. The individual broiler is fixed in said fixing device (2) with the breast side outwards, and in such a manner that said axis of rotation (24) is stretching right through the broiler perpendicular to back and breast bone thereof. The individual broiler - fixed in said individual movable fixing device (2) - furthermore may be rotated about a vertical axis perpendicular to the direction of conveyance of the broiler. In a simple manner it is hereby possible to obtain a precise fixing of the individual broiler in such a manner that it, during the secondary slaughtering process, may assume any desired positions of rotation around a horizontal axis stretching parallel with the primary direction of conveyance of the broiler. That is that the broiler during the precarious eviscerating may be placed in such a manner that organs and entrails inclusive intestines - after the eviscerating - may hang away from the broiler in such a manner that the outside of the broiler may not be in touch with the intestines.



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### **Method and apparatus for handling of slaughtered poultry, in particular broilers**

The present invention relates to a method for handling of slaughtered poultry, in particular broilers.

In connection with slaughtering, picking, cutting open, eviscerating, and carving of  
5 slaughtered poultry, for instance broilers, the broilers are transported between the  
respective processing stations by means of several separate hanging conveyors with  
each its type of shackles, in which the broilers normally are suspended in the feet or the  
legs.

- 10 During killing, scalding, picking and cut off of head and neck skin the broilers are  
usually suspended in so-called slaughtering shackles, where the broilers are suspended  
in the foot joint or drumsticks. Before the cutting open and eviscerating of the entrails  
the broilers are hung over to a hanging conveyor with shackles, in which the broilers  
are suspended in thighs or "knee joint". During this hanging-over process - namely  
15 while the foot joint or drumstick still is fixed in said first hanging conveyor and "knee  
joint" is fixed in peripheral recesses of horizontal transfer wheels of a hanging-over  
apparatus - the feet and drumsticks are cut off by passage of a rotating knife.

Lately there has been some talk of the fact that an unacceptable large percentage of  
20 broilers already before they are delivered to the slaughterhouse are infected with salmo-  
nella bacteria, which consequently may be seriously injurious to health, if infected  
broilermeat is not well-done during cooking.

As mentioned the problem with salmonella infected broilers does not arise in the  
25 slaughterhouses. Nevertheless it is not possible to avoid to worsen the problem during  
the current handling of slaughtered poultry during the slaughtering process, as very few  
salmonella infected broilers almost inevitable cause that a large number of slaughtering  
broilers are cross-contaminated with salmonella bacteria. In practice the biggest risk for  
cross-contaminering exist at said secondary slaughtering line, where cutting open and  
30 eviscerating of entrails etc. are carried out, as salmonella bacteria are to be found first  
of all in the intestines. During eviscerating of entrails the broiler is as mentioned  
suspended in the "knee joint", that is that entrails in the form of organs and intestines  
immediately after the eviscerating hang down the outside of the broiler among others  
for veterinary inspection. And it is obvious, that in particular this eviscerating method  
35 is an obvious possibility for cross-contamination during the slaughtering process, as the  
individual broilers furthermore may touch each other.

The invention has for its purpose to provide an improved method for handling of slaughtered poultry, in particular broilers, during the said secondary slaughtering process, that is in that part of the slaughtering process, where the cutting open and eviscerating of entrails are carried out, such that the said possibility for cross contamination may be prevented or reduced - and where a very considerable increase of capacity of the said secondary slaughtering line at the same time may be obtained.

The method according to the invention is distinctive in that the individual broiler - during said secondary slaughtering process, where the cutting open and eviscerating of organs and entrails are carried out - is fixed in an individual movable fixing device in such a manner that the fixed broiler in a precise manner may be rotated around a horizontal axis stretching parallel with the direction of conveyance.

In a simple manner it is hereby possible to obtain a precise fixing of the individual broiler in such a manner that it during the secondary slaughtering process may assume any desired positions of rotation around a horizontal axis stretching parallel with the primary direction of conveyance of the broiler. That is that the broiler during the precarious eviscerating process may be placed in such a manner that organs and entrails inclusive intestines - during and after the eviscerating - may be moved away from the broiler downwards.

Appropriately the method according to the invention may furthermore be such carried out, that the individual broiler is fixed in said fixing device with the breast side outwards, and such that said axis of rotation is stretching right through the broiler perpendicular to back and breast bone thereof.

According to the invention it may moreover be advantageously, that the individual broiler - fixed in said individual movable fixing device - furthermore may be rotated about a vertical axis perpendicular to the direction of conveyance of the broiler.

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The invention also relates to an apparatus comprising an endless conveyor to be used at the carrying out of the method according to the invention, which apparatus is distinctive in that the conveyor comprises partial plate-shaped chain links, which by means of horizontal combined supporting and turning wheels are stretching vertical, and which downwards are provided with bearing means for individual movable fixing devices, each of which being adapted for fixing a broiler, and which may be rotated about a horizontal axis stretching parallel with the primary direction of movement of the conveyor.

Particularly for use at further cutting open of broilers the apparatus according to the invention advantageously may be such provided, that said bearing means for the individual movable fixing devices furthermore are adapted to be rotated about a vertical axis stretching perpendicular to the primary direction of movement of the conveyor, 5 that is such that a broiler fixed in an individual fixing device may assume desired positions of rotation being optimized in accordance with the individual working processes. In connection with a separate cutting open line the endless chain conveyor may be such provided, that only every second chain link is provided with bearing means for fixing devices. In return the individual broilers may be fixed in individual 10 movable fixing devices permitting the broiler to be rotated both around a horizontal and a vertical axis in relation to the primary direction of conveyance of the broiler.

Appropriately the apparatus according to the invention may be such provided, that said bearing means for rotation of the individual movable fixing devices comprise a worm 15 drive, which via a vertical shaft - stretching through a connecting joint between said plate-shaped chain links - being adapted to be driven by means of upper gear wheels by the passage of and the engagement with stationary toothed racks.

With particular advantage said fixing devices may be adapted to fix a broiler with the 20 breast side outwards and such that said axis of rotation stretches right through the broiler perpendicular to the back and breast bone thereof.

More specific the apparatus according to the invention may be such provided, that the fixing device comprises a solid angular double bow, which is adapted to support the 25 back side of a broiler, to support the hind part of the broiler body and to spread out the thighs of the broiler, and a pair of mutually swingable holding members being adapted to squeeze the hind part of the broiler body and thighs against the first-mentioned double bow and to support the broiler from the breast side, respectively.

30 The invention is explained in more detail in the following with reference to the drawing, in which:-

Fig. 1 shows a schematic view of an embodiment for a processing apparatus for slaughtered poultry for illustration of the movement from process step to 35 process step of the individual animal,

Fig. 2 shows schematic views showing actual position of the broilers in the respective process steps,

- Fig. 3 shows an embodiment for a conveyor chain with fixing devices for the individual broilers according to the invention,
- Fig. 4 shows how the conveyor chain cf. Fig. 3 may stretch through curves,
- 5 Fig. 5 shows an other embodiment for a fixing device with a fixed broiler, seen from the tail,
- Fig. 6 shows a fixing device cf. Fig. 5, where the broiler is seen from the breast side,
- 10 Fig. 7 shows a fixing device cf. Fig. 5, where the broiler is seen inclined from below and from the side,
- 15 Fig. 8 shows the fixing device cf. Fig. 5 with the breast supporting bow in a swung-up position,
- Figs. 9-16 show different rotating positions around a horizontal axis of a broiler fixed in a fixing device cf. Fig. 3 of the apparatus according to the invention.
- 20 Fig. 17 shows a schematic view of a preferred embodiment for a so-called EV-line for slaughtered poultry for illustration of the movement between the respective process steps of the individual animal,
- 25 Figs. 18-28 shows the rotating positions at the respective process steps of the individual animal,
- Fig. 29 shows a side view of two conveyor links with fixing devices for the respective animals,
- 30 Fig. 30 shows how inspection of animals and belonging entrails is carried out by passaging the veterinary controller,
- Figs. 31-33 shows how the eviscerating of entrails itself is carried out,
- 35 Fig. 34 shows how the transfer of entrails to a separat conveyor is carried out,

Fig. 35 shows a side view of a preferred embodiment for a fixing device according to the invention, and

Fig. 36 shows a corresponding side view of the fixing device shown in Fig. 35, where a lid is removed.

The secondary slaughtering line shown in Figs. 1 and 2 where cutting open and eviscerating etc. are carried out, is - to make it easier to explain the invention - traditionally built up, that is that each working process is carried out in processing apparatuses combined with a turning wheel. Although it shall be emphasized, that a secondary slaughtering line according to the invention in principle may be considerably more effectively utilized, since individual fixing of the individual broilers may make the individual processing operations more effective, as time and space is saved at the entrance to each turning wheel to have the broilers at rest and in position.

In position A the broilers arrive from the primary slaughtering line and via a traditional hanging-over the broilers are delivered to individual fixing devices 2 (Fig. 3), where the broiler is fixed with the back against the fixing device 2 comprising an angular double bow 4, which at a closed end part comprises an angle part 6 adapted to surround the hind part of the body of the broiler and at the same time to spread the thighs (drumsticks), before a double holding bow 8 is swung inwards and squeezes the thighs and the hind part of the broiler, while a further double bow 9 thereafter is fixing the broiler from the breast side (Figs. 5-8).

In position B a circular cut around the rectum opening (vent cutting) is carried out, in such a manner that subsequently in position C a lengthwise cut towards the breast bone (cut open) may be carried out, before in position D eviscerating of entrails in form of organs and entrails (eviscerator) may be carried out, which cf. Fig. 2 may be hanging away from the broiler.

In position E gizzards and gullets (cropping) are pulled out before the neck is broken off (neck-breaking) in position F. Lung suction is thereafter carried out in position G, before the broiler is interior rinsed in position H, whereafter the broiler is transferred to next processing line - cutting up. Between position D and E the so-called "pack-pulling" is carried out, that is that the entrails package from the individual broiler is released and hung up in special holding means of separate synchron line 10, so that the belonging broilers and entrails packages are following each other when passing the



veterinary control 12, before the entrails packages leave the secondary slaughtering line.

The secondary slaughtering line according to the invention is built-up with an endless chain conveyor 14 (Figs. 3 and 4) with partly plate-shaped, horizontal chain links 16. At the bottom each of these links are provided with downward directed bearing brackets 18 and 20, which via a connecting plate 22 is secured to the chain links 16. Between the bearing brackets 18 and 20 is arranged a horizontal shaft 24, which may be rotated freely in the bearing bracket 18, and which is connected with a worm drive 26 at the bottom part of the bearing bracket 20. A vertical shaft for the worm drive 26 is stretching through the bearing bracket 20, the chain link 17 to an upper gear wheel 28 co-operating with a stationary toothed rack 30, that is that rotation of the fixing device 2 around the shaft 24 is controlled by the primary forward movement of the chain conveyor combined with stationary toothed racks 30 and gear wheels 28, respectively.

Possibly the connecting plates 22 may be adapted to be swung out in relation to the chain links 16, as a tubular shaft to a lowermost controlling gear wheel in that case should surrounds the shaft for the worm drive 26, and possibly it may be advantageously that each second link of the chain conveyor in that case comprises lower fixing devices 2.

Figs. 9 - 16 show different turning positions of the fixing device 2, respectively the fixed broiler.

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According to the main aspect of the invention it is most important, that the individual broiler during its movement through the secondary slaughtering line, that is during cutting open and eviscerating etc., may be fixed in such a well defined manner, that the position of the broiler may be optimized for the individual working process, as it among others is of great importance that the evisceration - to avoid cross-contamination - may be carried out without the entrails subsequently become in touch with the outside of the broiler.

Generally it is expected that the capacity of the secondary slaughtering line and possibly of the subsequent cutting up lines may be increased considerably for instance from the today common 6,000 animals per hour up to 16-20,000 animals per hour and even with reduced requirements of space, among others because there according to the invention -

will not be used superfluous time and space for bringing the hanging broilers at rest and in a correct position before each working process.

The preferred embodiment shown in Fig. 17 for the secondary slaughtering line, where cutting open and eviscerating etc. is carried out - to simplify the understanding - where ever possible - is used the same reference letters as for the slaughtering line shown in Figs. 1 and 2, as the secondary slaughtering line also in the preferred embodiment - primary because of space - is such built-up that each working process is carried out in processing stations combined with a turning wheel.

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In position A the broilers are transferred from the primary slaughtering line, and the broilers are secured in individual fixing devices (Figs. 35, 36) in such a manner that the individual animal in the respective process steps may assume certain positions of rotation shown in Fig. 17 in miniature on level with the respective process steps, and which furthermore are shown enlarged in Figs. 18 - 28, that is that the broilers in position A, where they are transferred from the primary slaughtering line and fixed in fixing devices assume the positions of rotation shown in Fig. 18.

In position B a circular cut around the rectum opening (vent-cutting) is carried out, while the broiler assume the position of rotation shown in Fig. 19, that is that the broiler is rotated 120° in relation to position A. Fig. 20 shows the position of rotation of the broiler in position C, where a lengthwise cutting open cut from the circular cut towards the breast bone (opening) is carried out.

In position D (Fig. 21) the eviscerating of entrails in form of organs and intestines (eviscerating) is carried out, which furthermore is shown in Figs. 31 - 33. Together with the eviscerating of entrails in position D a so-called "packpulling" furthermore is carried out, where the total entrails package from the individual broiler is released and hung up in special holding means of a separate conveyor (Fig. 34), so that the broilers and entrails packages may follow each other when passing the veterinary control, where the broilers assume the position of rotation shown in Fig. 22. The entrail packages leave the secondary slaughtering line via the separate conveyor, before the broilers come to position G, namely when the broilers assume the position of rotation shown in Fig. 23.

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In position G lung suction is carried out, while the broilers assume the position of rotation shown in Fig. 24. In position E the so-called cropping is carried out, where gizzard and the rest of the gullet are pulled out, while the broiler assumes the position

rotation shown in Fig. 25, that is where the broiler is rotated 180° since position G. In position F the neck is broken (neckbreaking), while the broiler assumes the position of rotation shown in Fig. 26. Interior rinsing of the broiler is carried out in position H, while the broiler assumes the position of rotation shown in Fig. 27, whereafter the  
5 broiler is transferred to next processing line - cutting up into suitable pieces.

Fig. 29 is a compound side view showing two partly plate-shaped links of a preferred embodiment for a conveyor to the secondary slaughtering line, and where the individual fixing devices 32 only are shown stylistic. Fig. 29 furthermore indicates how the total  
10 entrail package is hung up on the said separate conveyor, but in front of each individual broiler.

Fig. 30 shows how broiler and belonging entrail package on each its conveyor at the same time pass the veterinary control. Figs. 31 - 33 show how eviscerating of entrail  
15 package is carried out, while Fig. 34 shows the transfer of entrail package to separate conveyor.

The preferred fixing device 32 is shown in more details in Figs. 35 and 36, where particularly Fig. 36 shows, how the movable fixing bows 8 and 9 - in the same manner  
20 as earlier described in connection with Figs. 3 - 8, co-operate with the stationary fixing bows 4 via a special spring-affected, self-fixing locking function, which may be released by means of the release arm 34.

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## CLAIMS

1. A method for handling slaughtered poultry, in particular broilers, *characterized* in that the individual broiler - during said secondary slaughtering process, where the cutting open and eviscerating of organs and entrails are carried out - is fixed in an individual movable fixing device in such a manner that the fixed broiler in a precise manner may be rotated around a horizontal axis stretching parallel with the direction of conveyance.
2. A method according to claim 1, *characterized* in that the individual broiler is fixed in said fixing device with the breast side outwards, and in such a manner that said axis of rotation is stretching right through the broiler perpendicular to back and breast bone thereof.
3. A method according to claim 1, *characterized* in that the individual broiler - fixed in said individual movable fixing device - furthermore may be rotated about a vertical axis perpendicular to the direction of conveyance of the broiler.
4. An apparatus for use by the method according to claim 1 and comprising an endless chain conveyor, *characterized* in that the chain conveyor comprises partial plate-shaped chain links, which by means of horizontal combined supporting and turning wheels are stretching vertical, and which downwards are provided with bearing means for individual movable fixing devices, each of which being adapted for fixing a broiler, and which may be rotated about a horizontal axis stretching parallel with the primary direction of movement of the conveyor.
5. An apparatus according to claim 4, *characterized* in that said bearing means for the individual movable fixing devices furthermore are adapted to be rotated about a vertical axis stretching perpendicular to the primary direction of movement of the conveyor, that is in such a manner that a broiler fixed in an individual fixing device may assume desired positions of rotation being optimized in accordance with the individual working processes.
6. An apparatus according to claim 4, *characterized* in that said bearing means for rotation of the individual movable fixing devices comprise a worm drive, which via a vertical shaft - stretching through a connecting joint between said plate-shaped chain

links - being adapted to be driven by means of upper gear wheels by the passage of and the engagement with stationary toothed racks.

7. An apparatus according to claim 4, *characterized* in that said fixing devices  
5 are adapted to fix a broiler with the breast side outwards and in such a manner that said axis of rotation stretches right through the broiler perpendicular to the back and breast bone thereof.

8. An apparatus according to claim 7, *characterized* in that the fixing device  
10 comprises a solid angular double bow, which is adapted to support the back side of a broiler, to support the hind part of the broiler body and to spread out the thighs of the broiler, and a pair of mutually swingable holding members being adapted to squeeze the hind part of the broiler body and thighs against the first-mentioned double bow and to support the broiler from the breast side, respectively.

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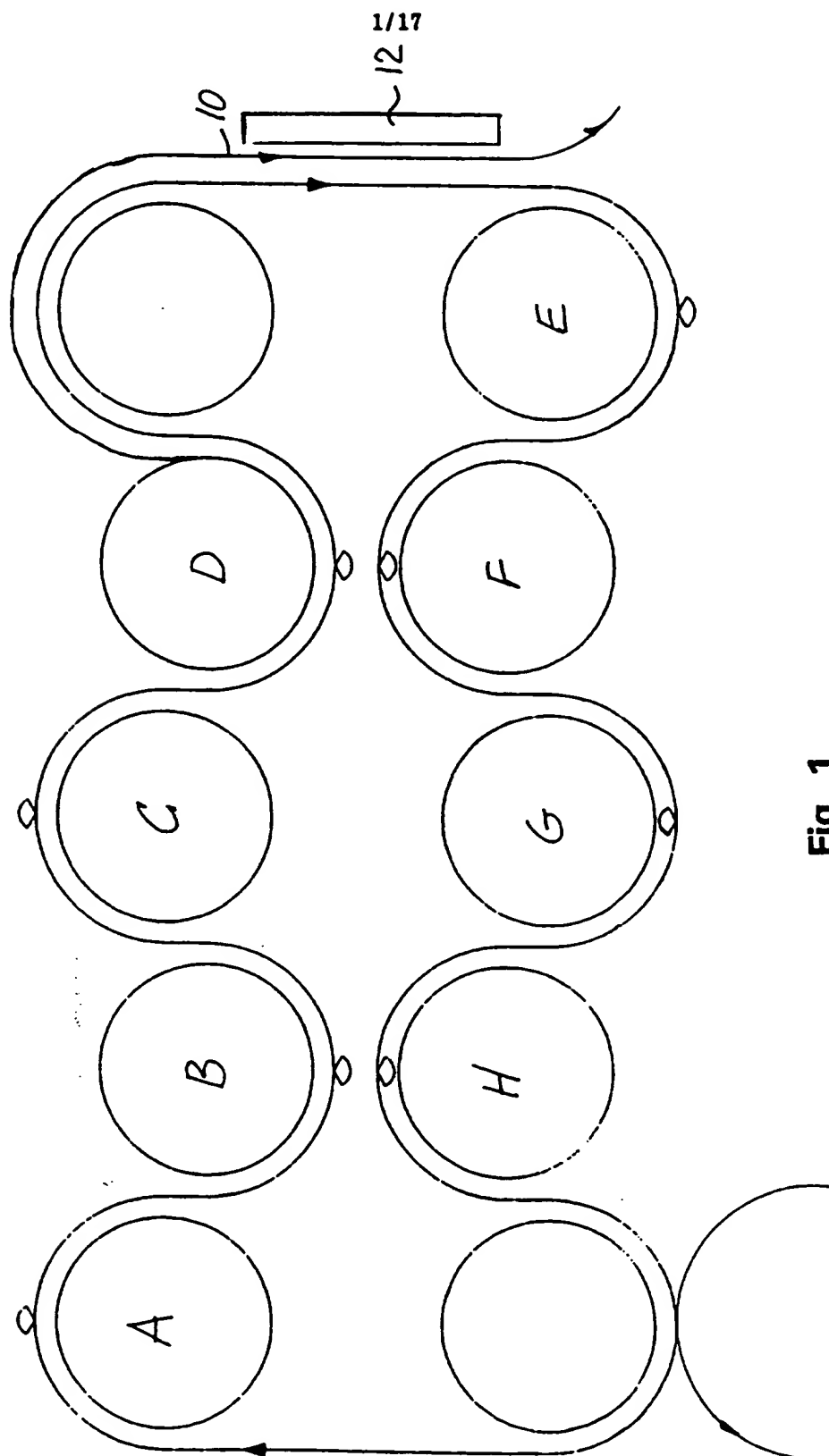


Fig. 1

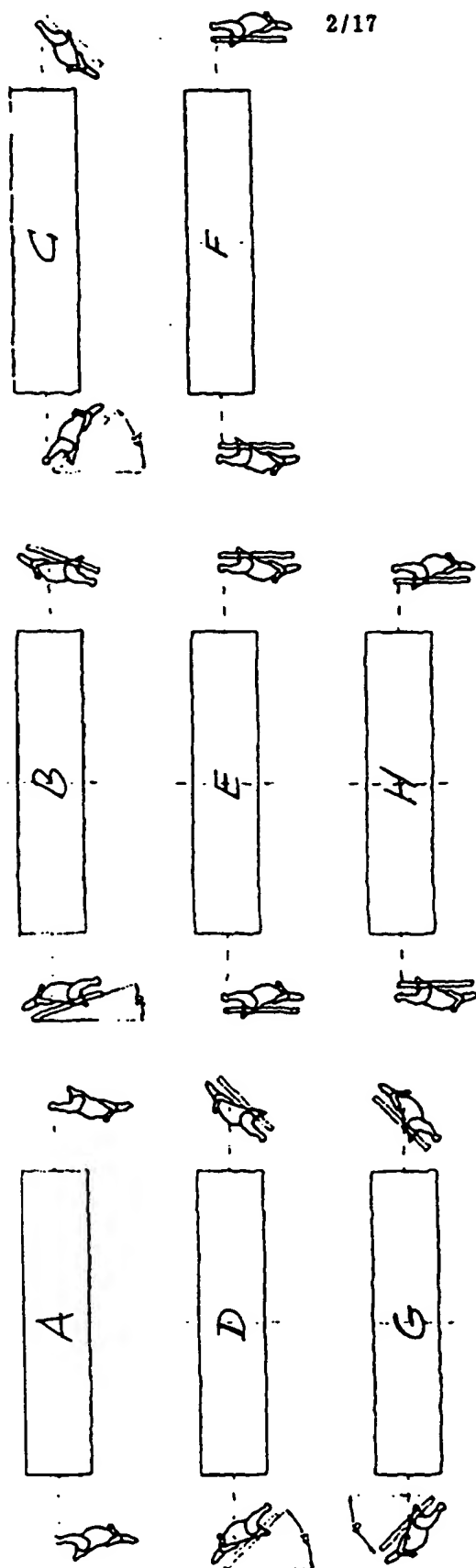


Fig. 2

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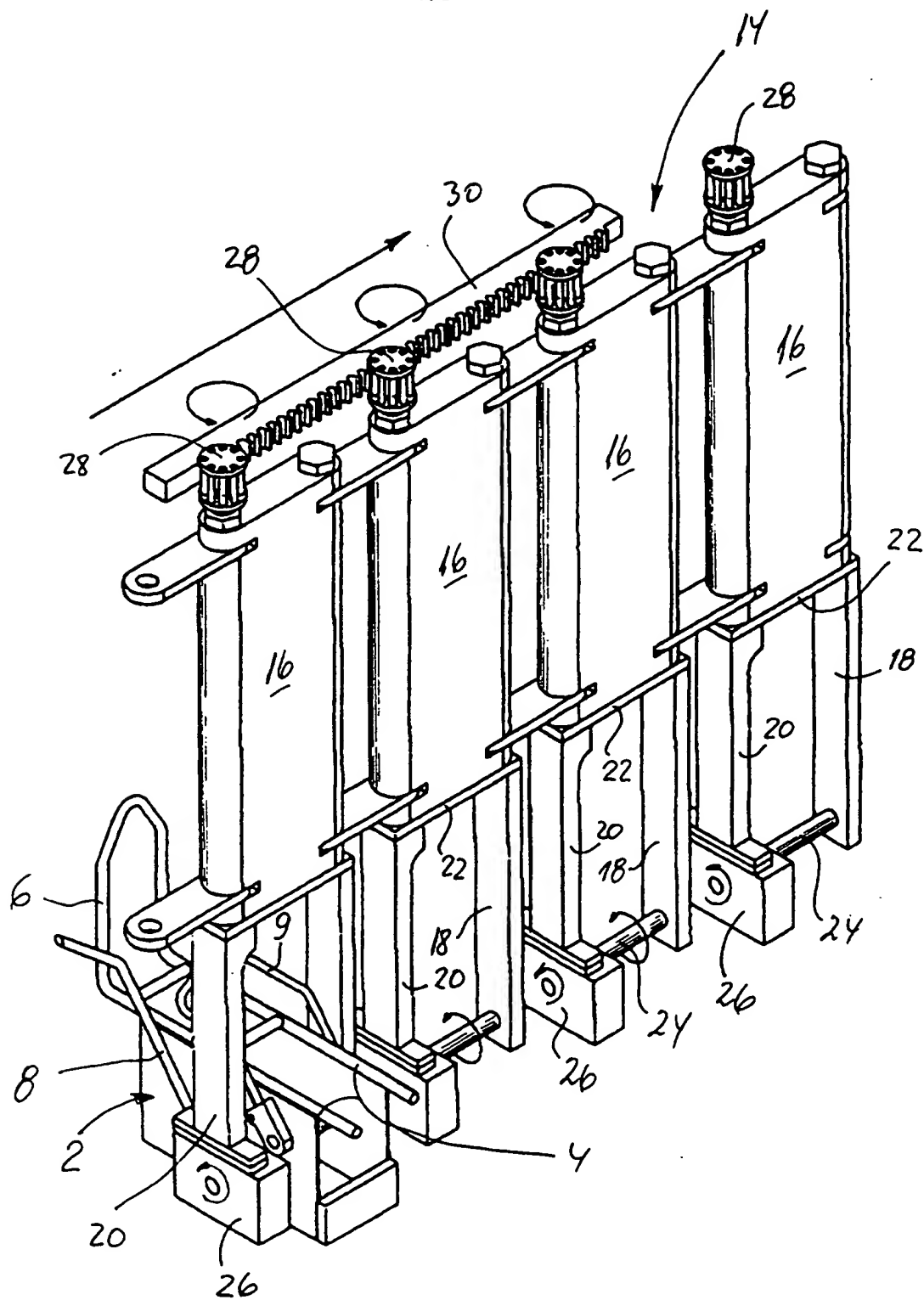


Fig. 3



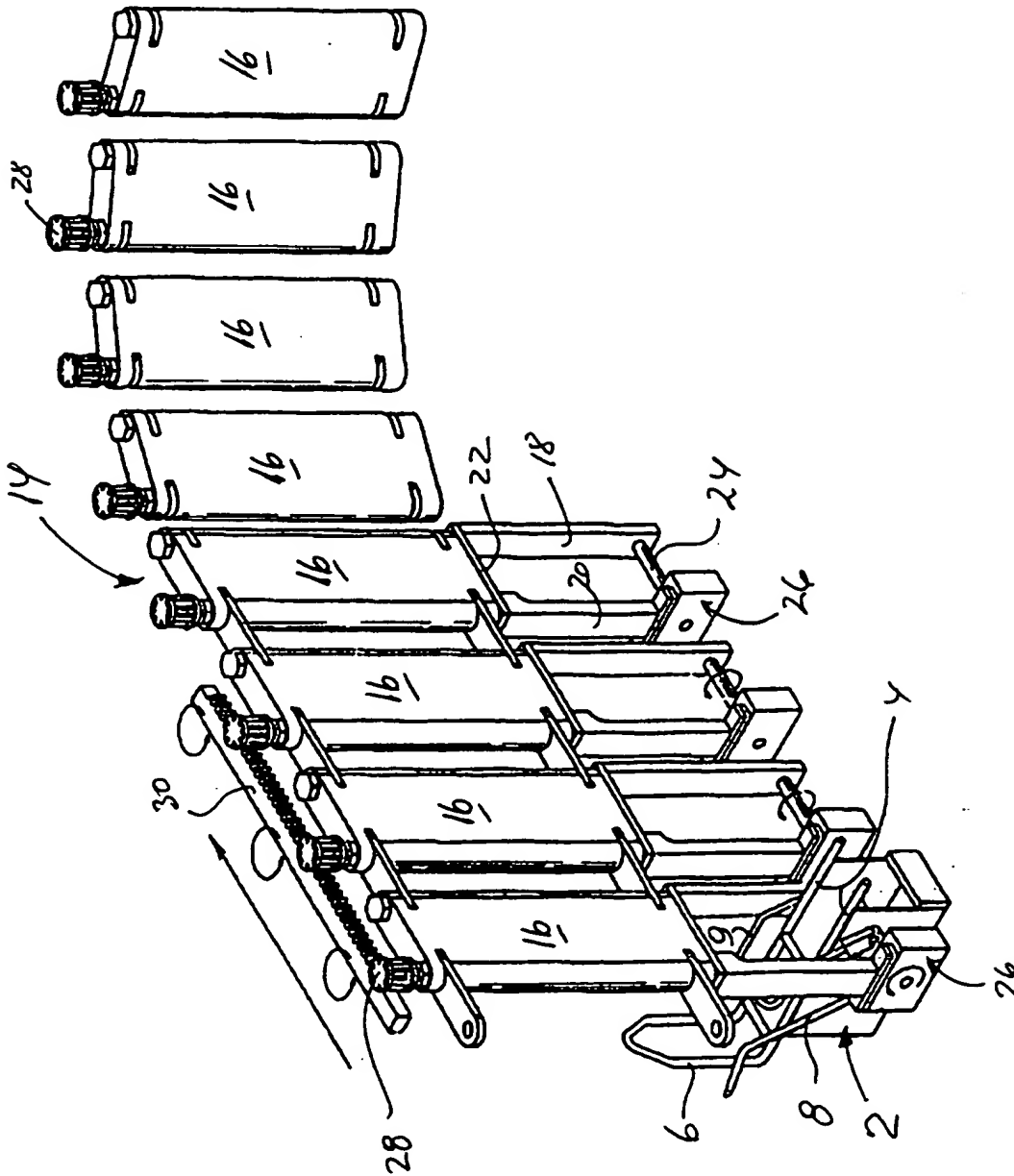


Fig. 4

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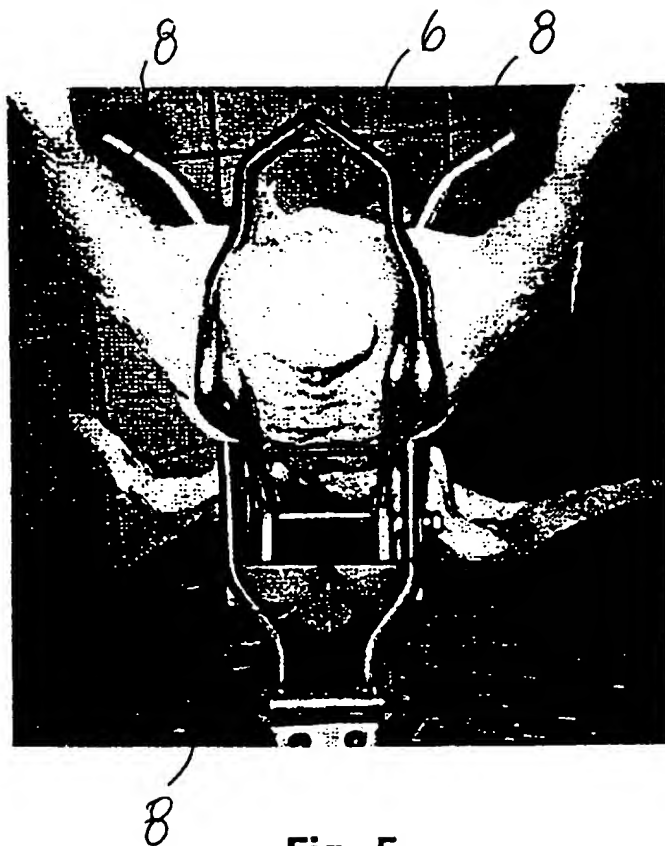


Fig. 5

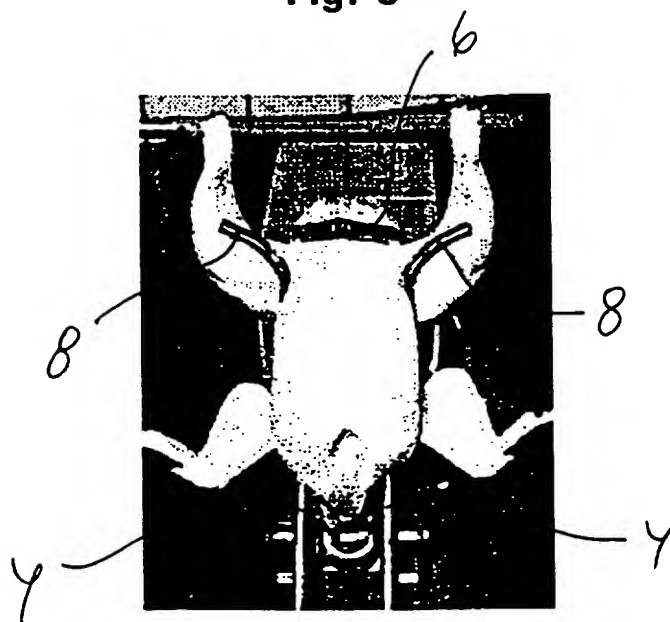


Fig. 6

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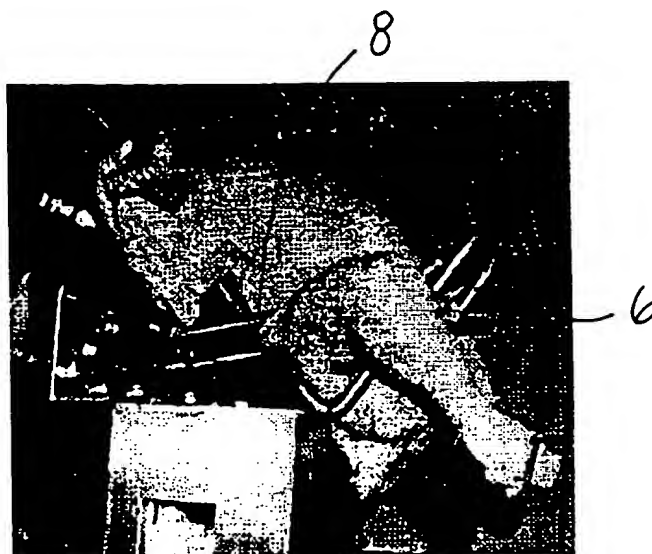


Fig. 7

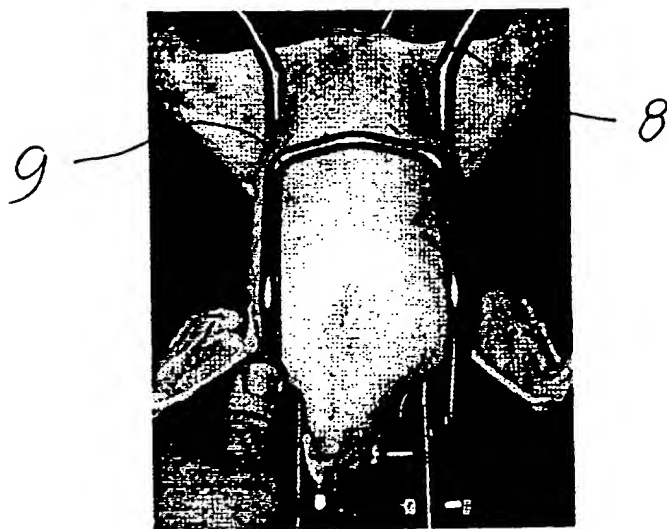


Fig. 8

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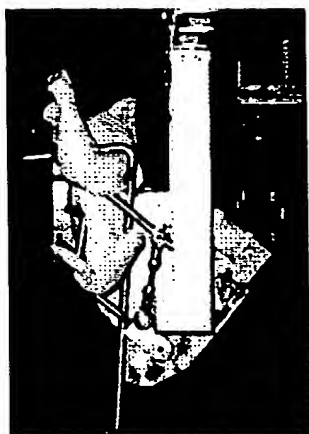


Fig. 9

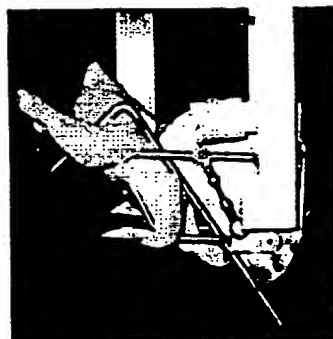


Fig. 10

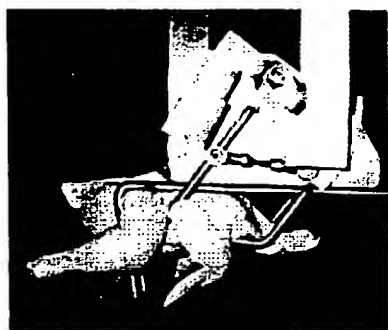


Fig. 11

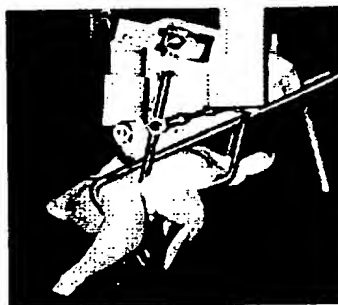
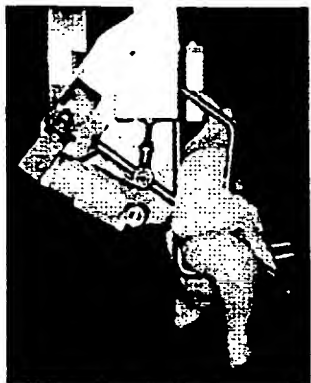
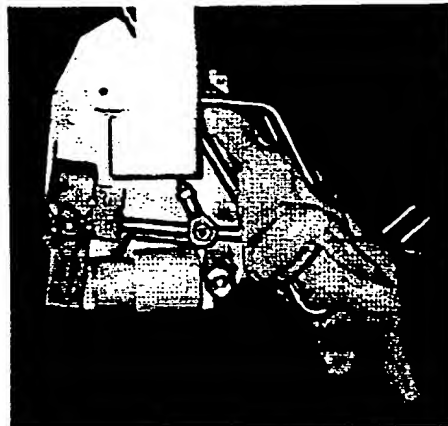


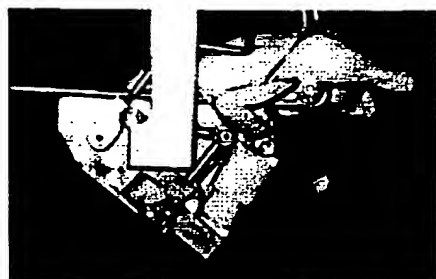
Fig. 12



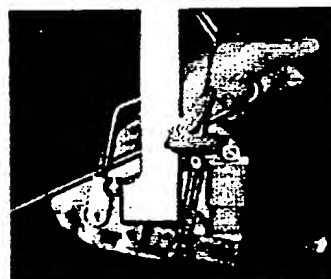
**Fig. 13**



**Fig. 14**



**Fig. 15**



**Fig. 16**

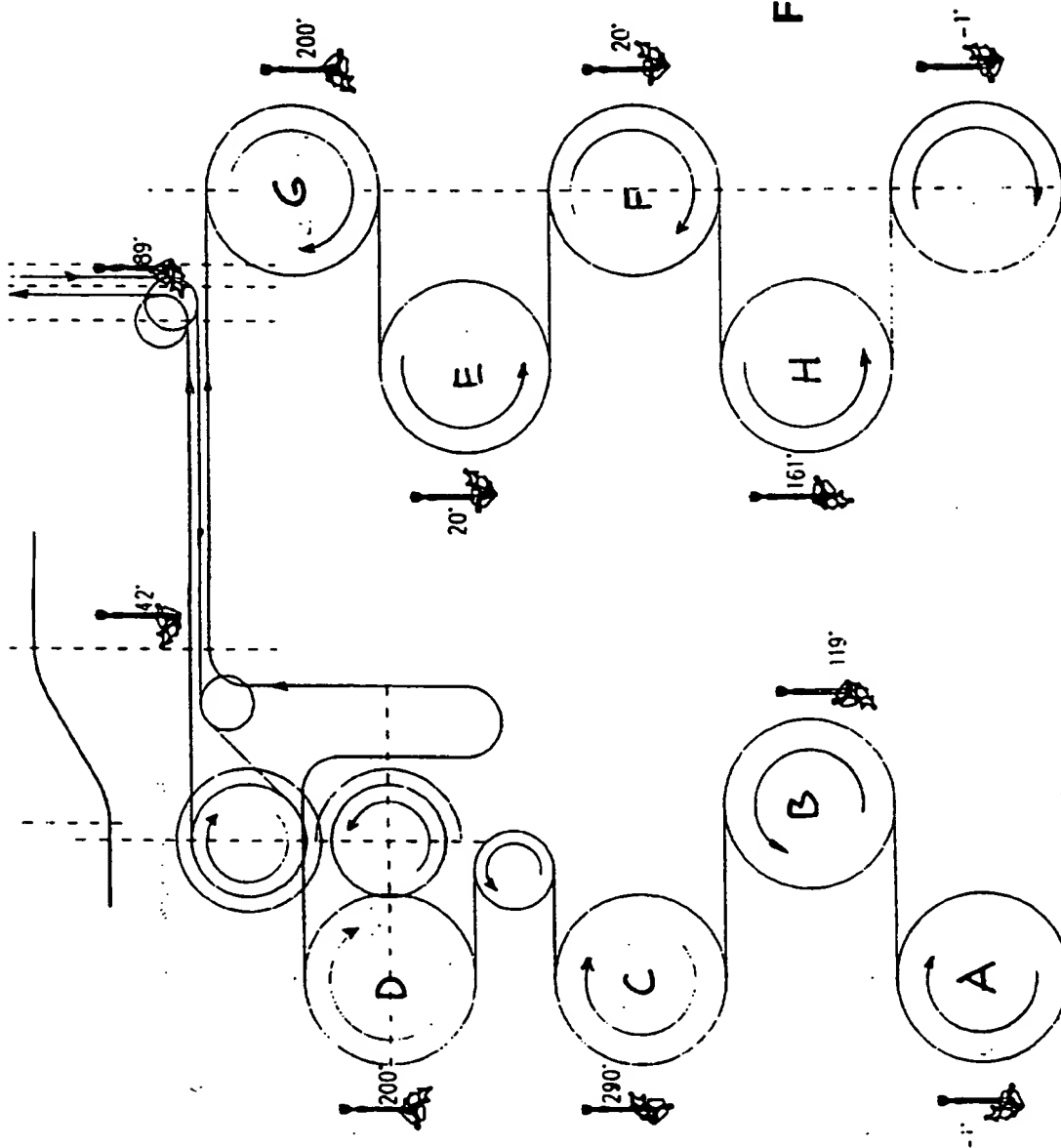


Fig. 17

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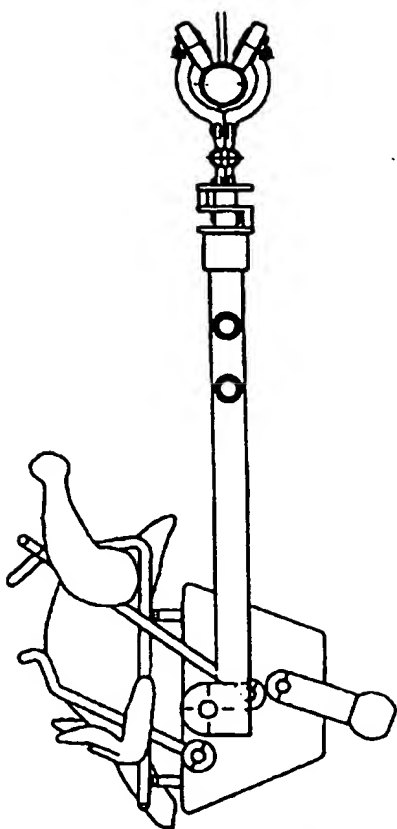


Fig. 18

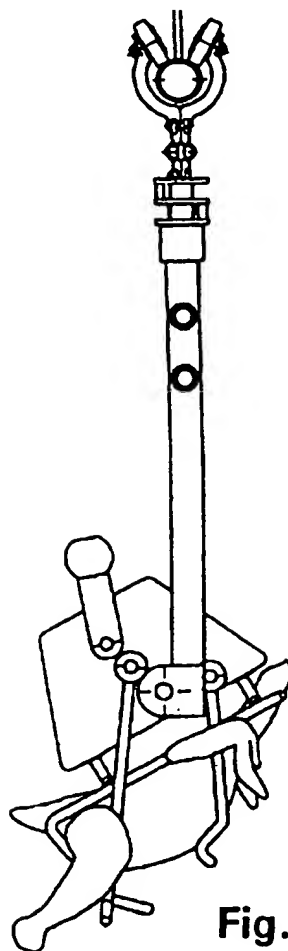


Fig. 19

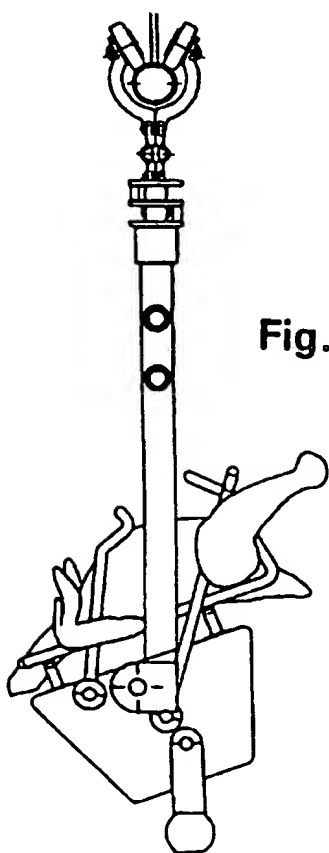


Fig. 20

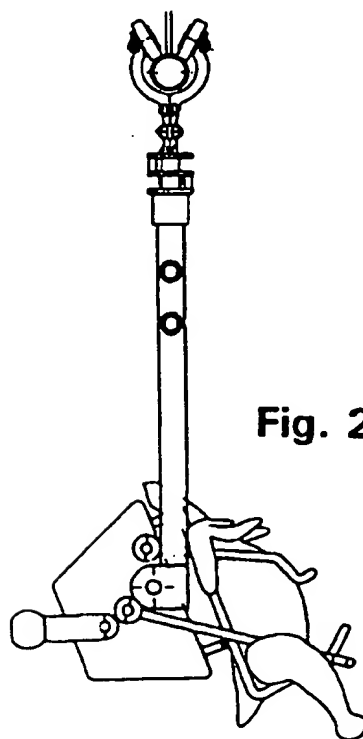


Fig. 21

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Fig. 22

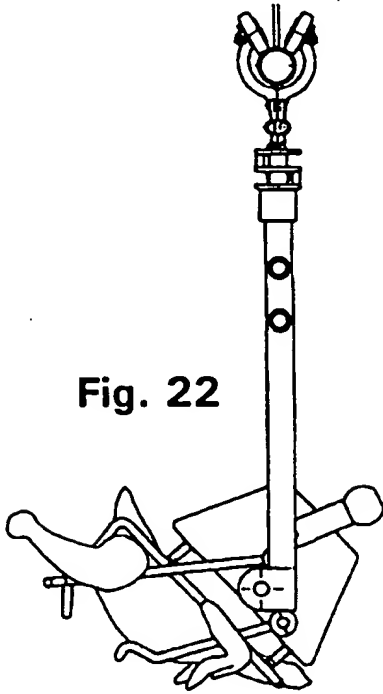


Fig. 23

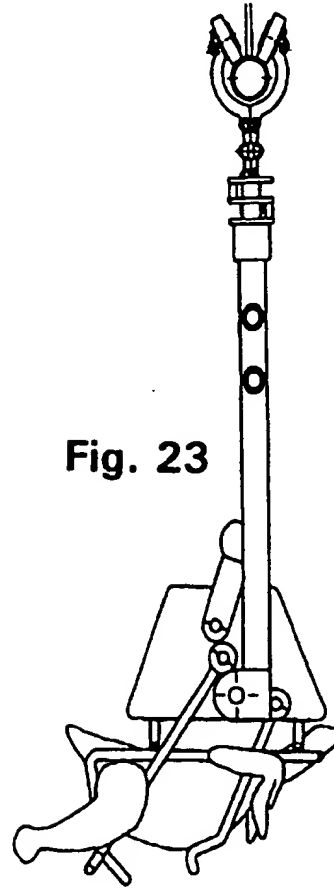


Fig. 24

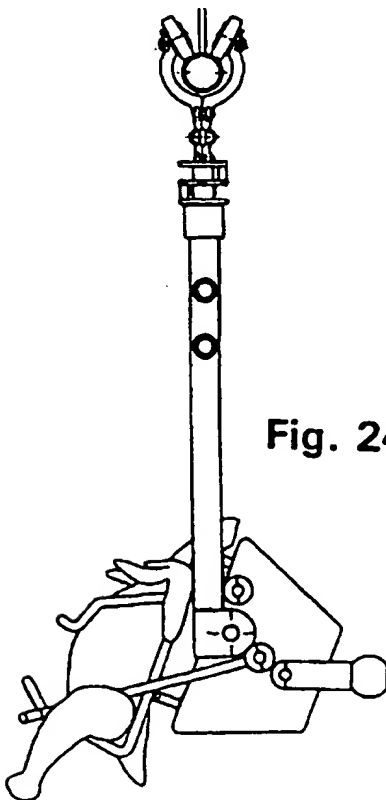
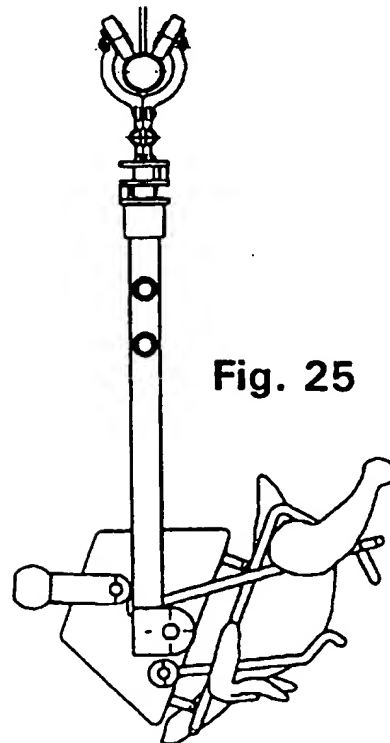
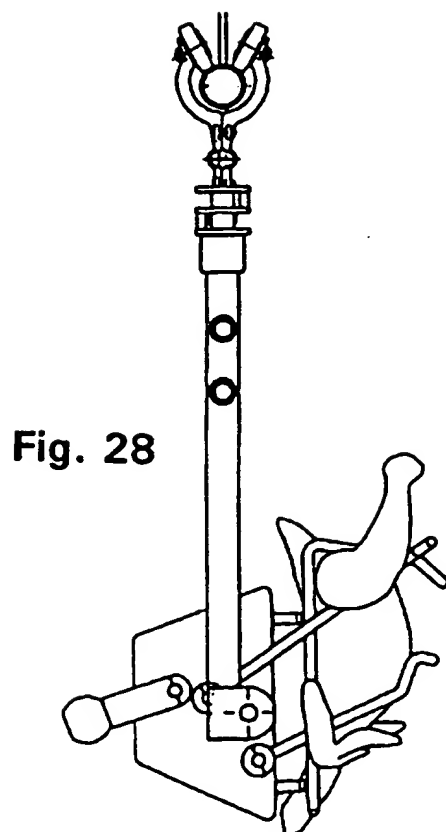
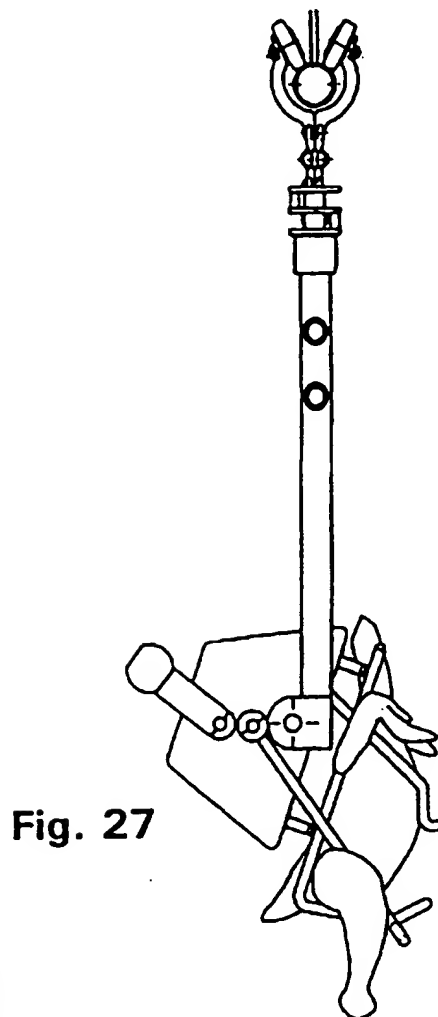
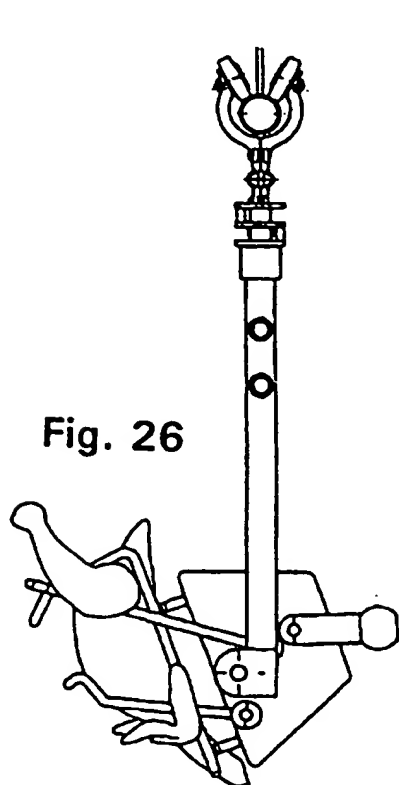


Fig. 25





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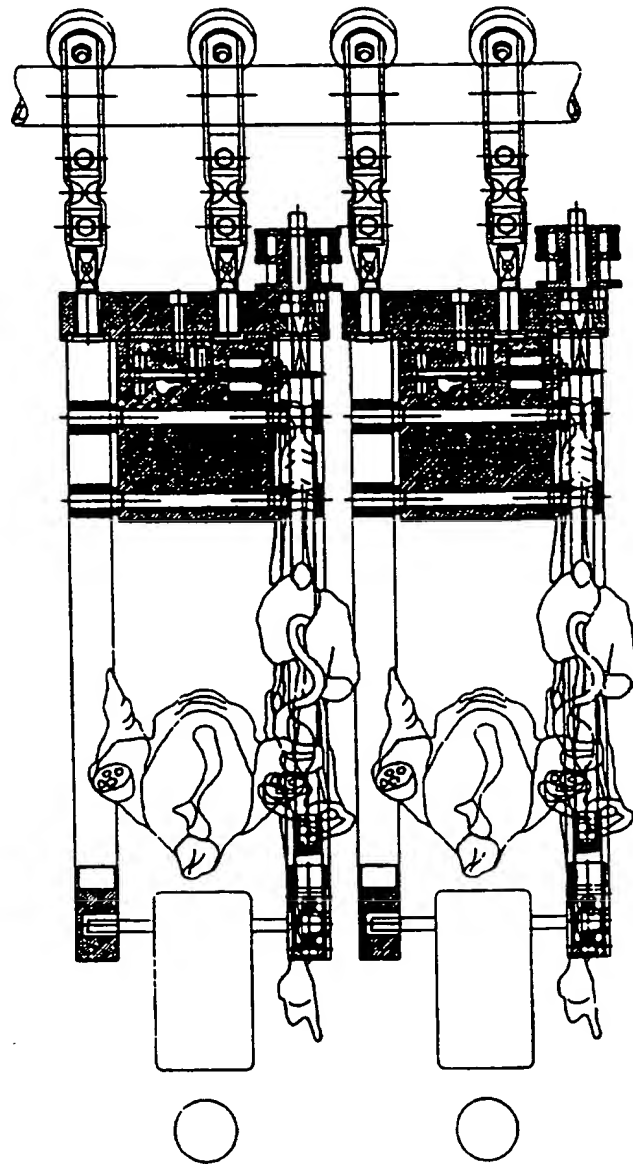


Fig. 29

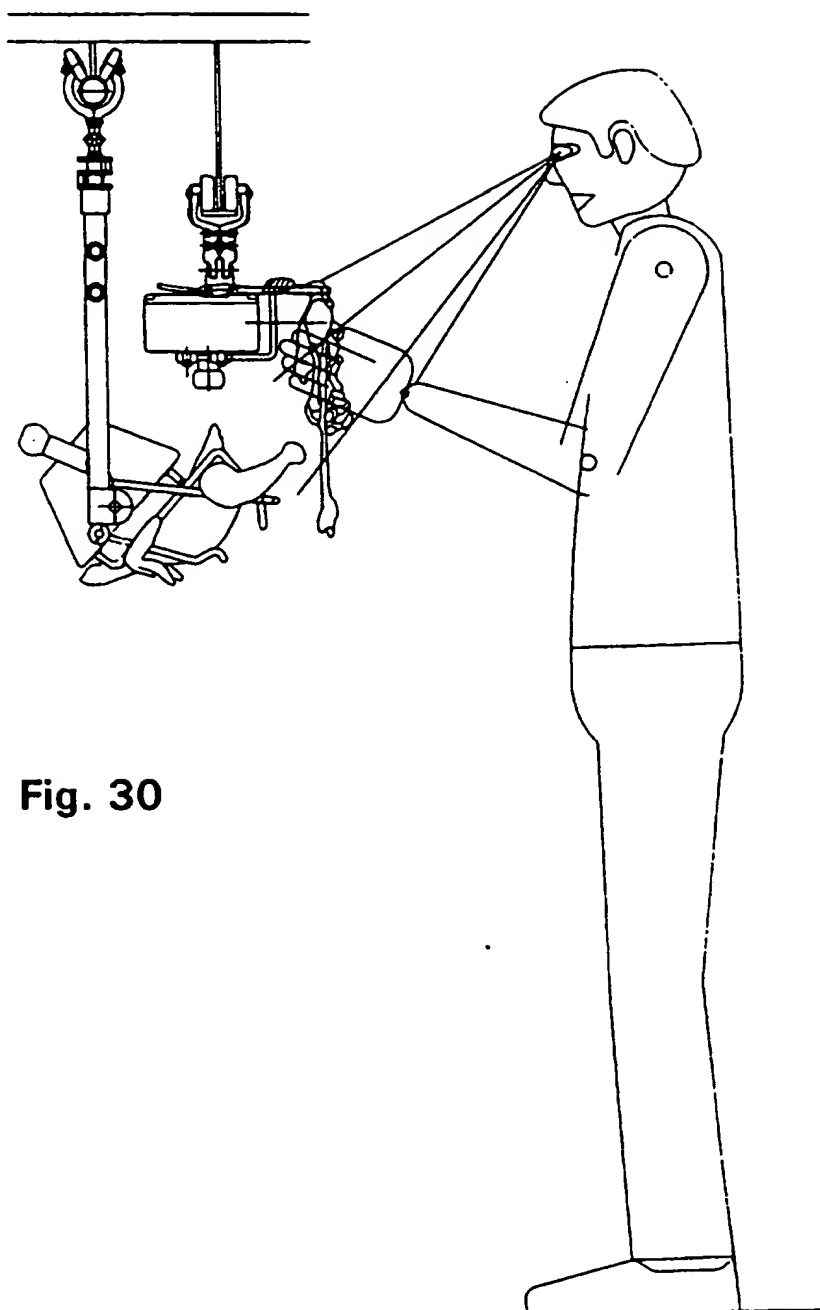


Fig. 30

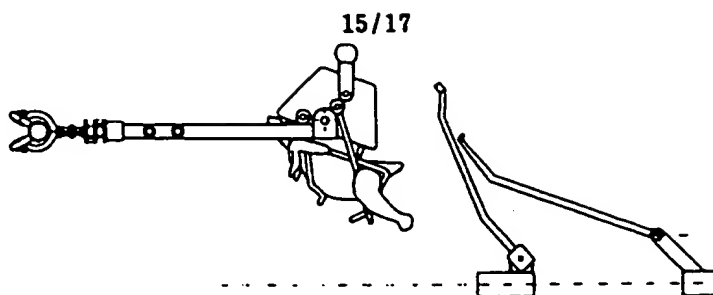


Fig. 33

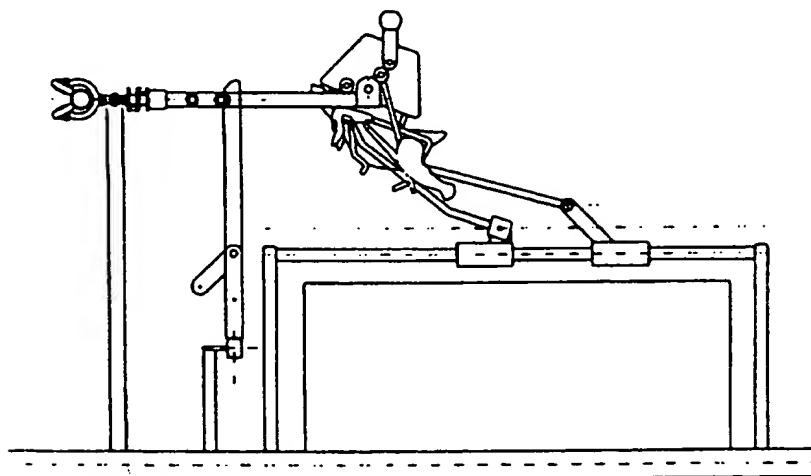


Fig. 32

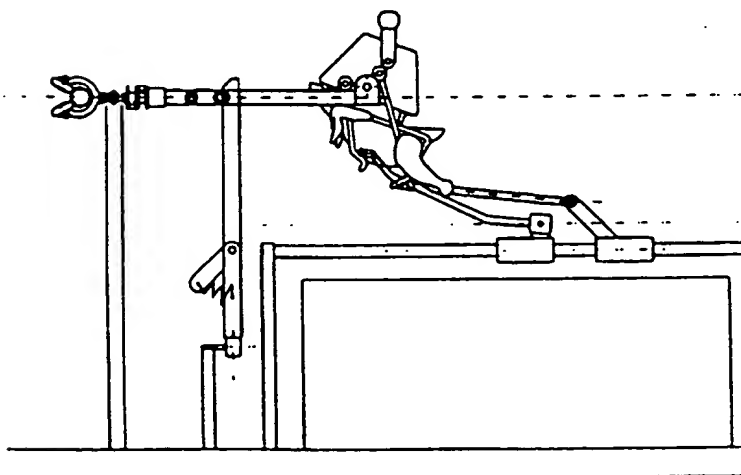


Fig. 31

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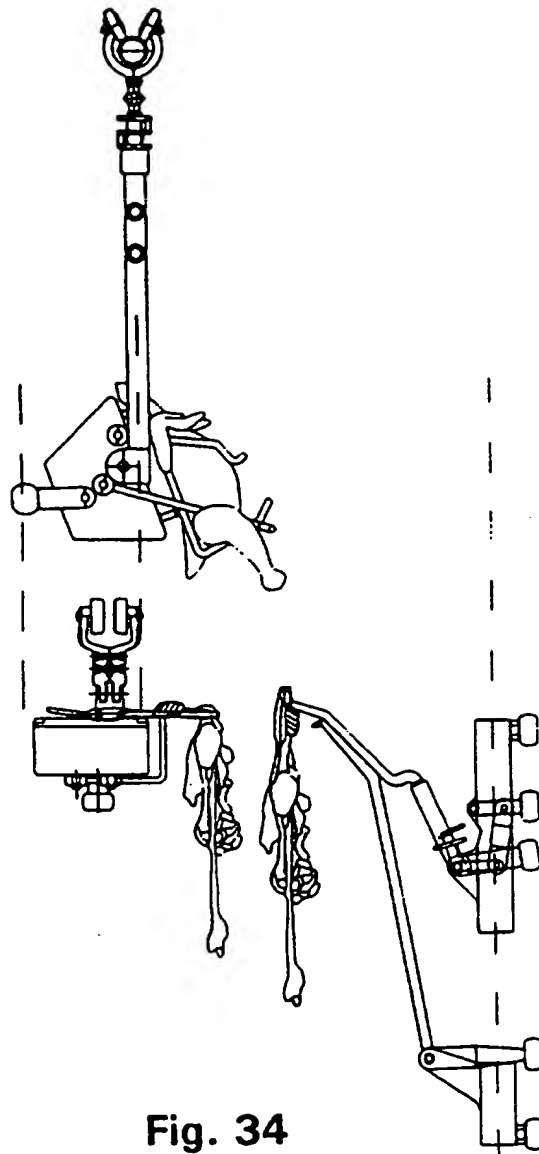
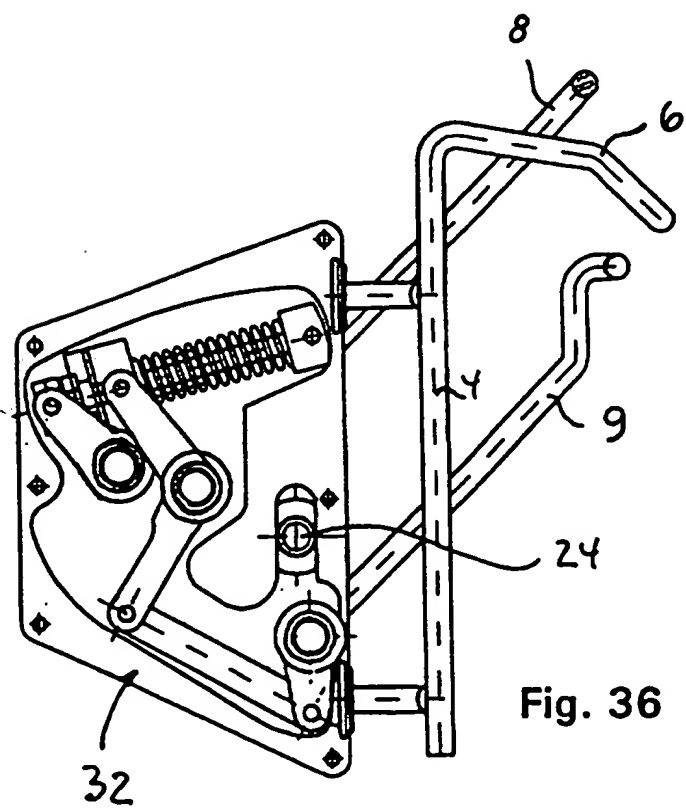
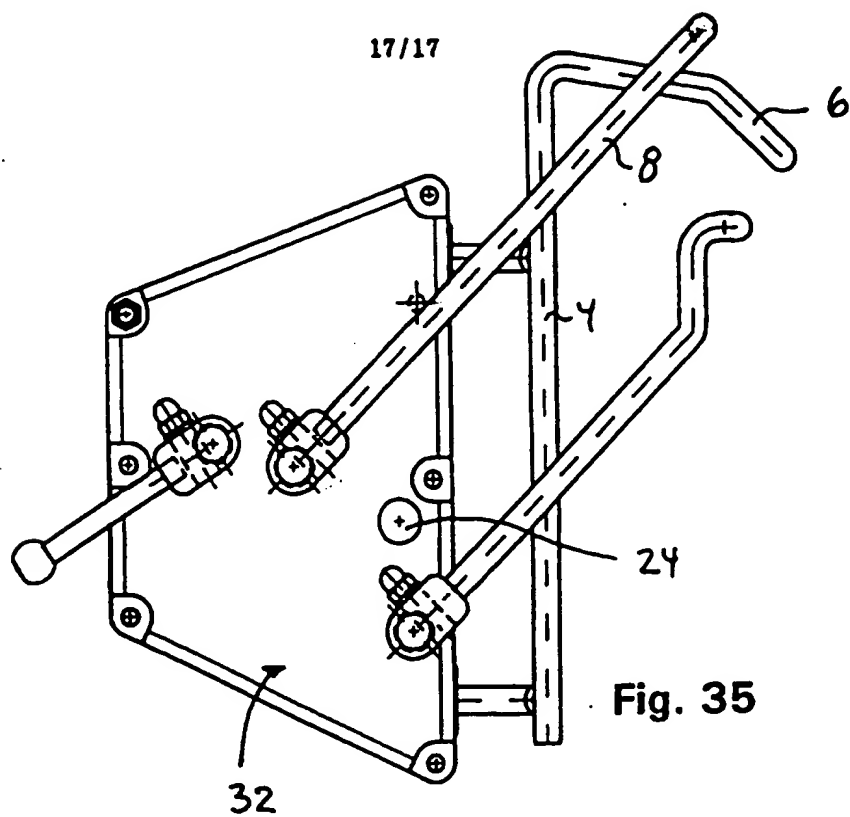


Fig. 34



## INTERNATIONAL SEARCH REPORT

International application No.

PCT/DK 95/00473

## A. CLASSIFICATION OF SUBJECT MATTER

IPC6: A22C 21/00

According to International Patent Classification (IPC) or to both national classification and IPC

## B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC6: A22C

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

SE,DK,FI,NO classes as above

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

## C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 3879803 A (VERBAKEL), 29 April 1975 (29.04.75), column 1, line 24 - line 34 --	1,2
A	US 4899421 A (VAN DER EERDEN), 13 February 1990 (13.02.90), column 1, line 43 - line 47 --	
A	GB 1378411 A (COPE WHELOON AND COMPANY LIMITED), 27 December 1974 (27.12.74), page 1, line 15 - line 37 --	4
A	US 5092815 A (POLKINGHORNE), 3 March 1992 (03.03.92) --	5



Further documents are listed in the continuation of Box C.



See patent family annex.

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Date of the actual completion of the international search

22 April 1996

Name and mailing address of the ISA/  
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Date of mailing of the international search report

26-04-1996

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Telephone No. +46 8 782 25 00

## INTERNATIONAL SEARCH REPORT

International application No.

PCT/DK 95/00473

## C (Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	US 4257142 A (HATHORN ET AL), 24 March 1981 (24.03.81)  --	8
A	US 2129968 A (O.E. SARGENT ET AL), 13 Sept 1938 (13.09.38)  --	1,2
A	US 4669148 A (SCHEIER), 2 June 1987 (02.06.87)  -- -----	



**INTERNATIONAL SEARCH REPORT**  
Information on patent family members

01/04/96

International application No.  
PCT/DK 95/00473

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GB-A- 1378411	27/12/74	NONE	
US-A- 5092815	03/03/92	AU-A- 7001891 CA-A- 2035059 EP-A,A- 0444782	01/08/91 31/07/91 04/09/91
US-A- 4257142	24/03/81	US-A- 4265001	05/05/81
US-A- 2129968	13/09/38	NONE	
US-A- 4669148	02/06/87	NONE	